

Appendix H

Commercial and Recreational Fisheries Summary

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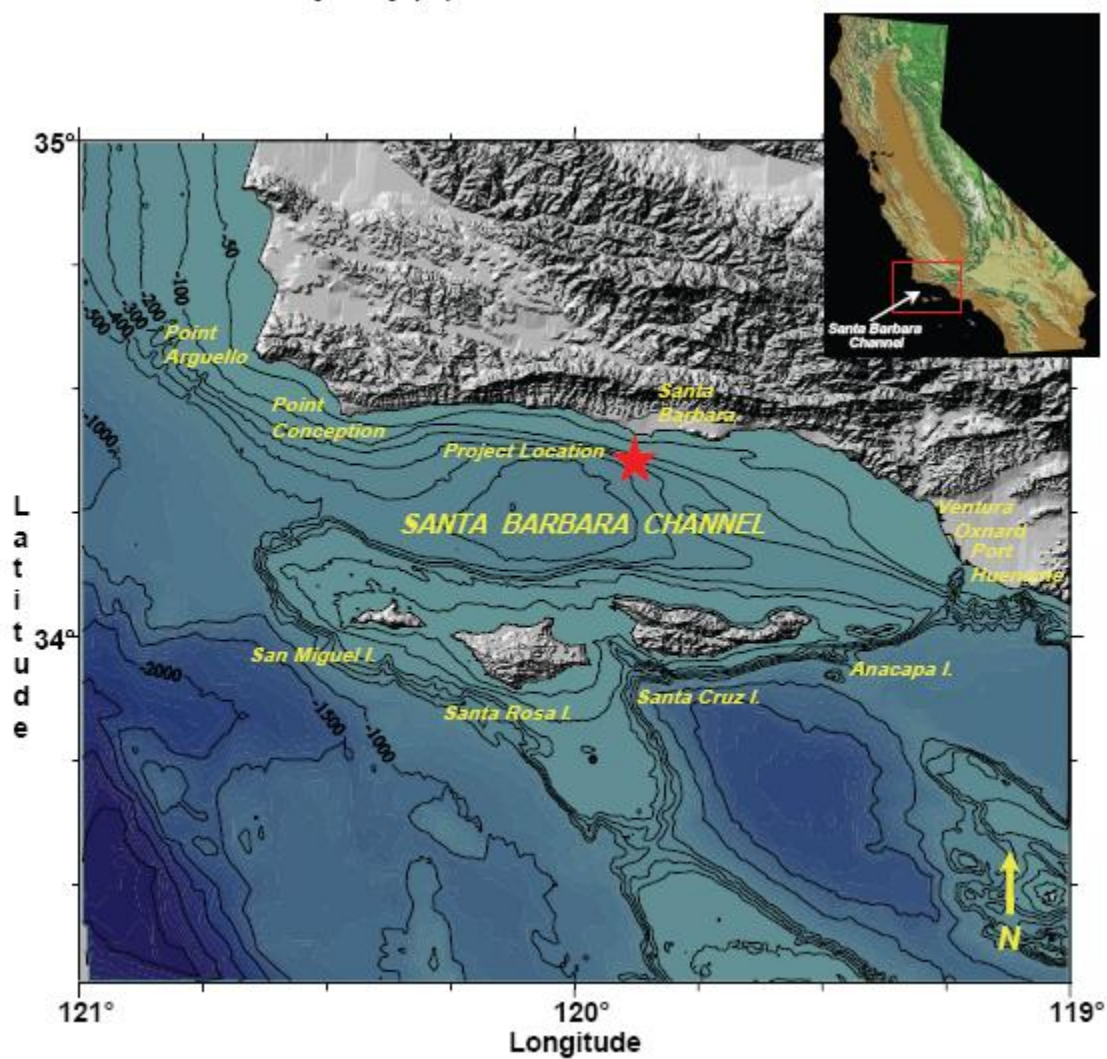
Commercial and recreational fishing activities occur at various locations within the Project area and surrounding environs. A wide variety of finfish and shellfish species are harvested in the Santa Barbara Channel area, while kelp is harvested in specific beds that are managed by CDFG. An analysis of fishery and kelp data collected around the Project area for the ten-year period from 1996 to 2005 forms the basis for the summary of commercial and recreational fishing that follows.

Fish blocks are statistical units used by CDFG (2006a) to organize and report commercial and recreational harvesting of marine organisms off the California coast (Figure H-1). Monthly catches are reported within rectangular blocks nominally covering 100 square miles (nine by 11-mile rectangular areas, or 278 km²). However, where the coastline bisects such blocks, they cover proportionally smaller ocean areas. The 27 fish blocks identified in Figure H-1 encompass an area of 2,400 square miles (6,216 km²) and are used here to assess potential impacts from the proposed Project on commercial and recreational fisheries in the region. Platform Holly and the offshore portions of the Project are located within Block 654, whose ocean area is reduced because it encompasses the Goleta and Ellwood coastline. Fish Block 654 extends into water depths of 1,300 feet (400 m) and contains seafloor habitat that varies from nearshore rocky shelf to soft sediments in water depths beyond 40 feet (12 m).

Commercial Fishing

Over the last decade, commercial fisheries within the Santa Barbara Channel have had a profound impact on local economies because over 89 percent of the weight and 93 percent of the value was landed at the four major ports within the Santa Barbara Channel (Santa Barbara, Ventura, Oxnard, and Port Hueneme). This 240,755-ton harvest was valued at \$121.07 Million (M) (Table H-1).

Figure H-1
Locations of California Department of Fish and Game (CDFG) Fish Blocks within
the Santa Barbara Channel



Source: CDFG 2006a.

Table H-1
Ranking of Fish Commercially Harvested in the SB Channel from 1996 to 2005

Total Weight (Tons)			Dollar Value (M)		
Taxon	Weight	Percent	Taxon	\$ Value	Percent
Squid	161,229	67.0%	Squid	47.31	39.1%
Sardine	30,699	12.8%	Urchin	23.46	19.4%
Anchovy	18,261	7.6%	Shrimp	10.40	8.6%
Urchin	15,181	6.3%	Lobster	9.98	8.2%
Mackerel	3,494	1.5%	Halibut	6.53	5.4%
Shrimp	2,740	1.1%	Crab	5.89	4.9%
Crab	2,432	1.0%	Sardine	2.74	2.3%
Tuna	1,593	0.7%	Anchovy	2.47	2.0%
Sea Cucumber	1,166	0.5%	Rockfish	2.36	1.9%
Halibut	990	0.4%	Abalone	2.00	1.7%
Lobster	682	0.3%	Seabass	1.78	1.5%
Shark	500	0.2%	Sea Cucumber	1.75	1.4%
Rockfish	465	0.2%	Shark	1.11	0.9%
Seabass	448	0.2%	Tuna	1.06	0.9%
Sheephead	116	0.0%	Sheephead	0.65	0.5%
Abalone	108	0.0%	Mackerel	0.27	0.2%
Grouper	95	0.0%	Salmon	0.21	0.2%
Sole	87	0.0%	Swordfish	0.19	0.2%
Snail	83	0.0%	Hagfish	0.12	0.1%
Skate	67	0.0%	Sole	0.11	0.1%
Hagfish	61	0.0%	Sablefish	0.11	0.1%
Barracuda	57	0.0%	Grouper	0.11	0.1%
Other	204	0.1%	Other	0.46	0.4%
Grand Total	240,755	100.0%	Grand Total	121.07	100.0%

Notes: Table is data based on combined landings at Santa Barbara, Oxnard, Ventura, Port Hueneme, Los Angeles, and Morro Bay.

1 ton = 0.9 metric ton.

Source: CDFG 2006a.

Of the over 199 different fish taxa harvested commercially within the 27-block study region from 1996 through 2005, a few major taxonomic groups represent the bulk of the commercial catch (Table H-1). For example, squid represented two thirds of the total biomass and 39 percent of the total catch value. Meanwhile, sardines, anchovies, urchins, mackerel, shrimp, and crab made up most (30 percent) of the remaining biomass. Pound for pound, however, the value of the individual fish taxa varied significantly. Consequently, more expensive taxa, such as urchin, shrimp, lobster,

1 halibut, and crab ranked higher in total dollar value, representing 76 percent of the value
2 of the non-squid fish harvest.

3 Table H-2 shows that the type of fish landed at each of the four port complexes varied.
4 This is largely due to differences in fishing fleets, areas fished, and the available
5 commercial facilities at each port. For example, the high dollar value (\$49.87 M) of the
6 commercial catch landed at Santa Barbara is largely due to non finfish species
7 harvested from the fishing grounds along the western Channel Islands. Urchin, lobster,
8 crab, shrimp, halibut, and abalone are of high commercial value and were the six most-
9 valuable taxa landed here during the ten year period. In fact, over half (58 percent) of
10 the urchin, lobster, crab, shrimp, and abalone harvested in the 27-block study region
11 were harvested from the four fish blocks (687 through 690 in Figure H-3) that
12 encompass the north shore of the western Channel Islands; species caught here are
13 preferentially landed at the Santa Barbara harbor because of its proximity.

14 In contrast to the range of taxa landed at Santa Barbara, market squid (*Loligo*
15 *opalescens*) overwhelmingly dominated the landings at the Hueneme/Oxnard (66.5
16 percent by weight and 66.9 percent by value) and Ventura (93.8 percent by weight and
17 57.6 percent by value) harbors over the last decade. Prior to April 1998 the market
18 squid fishery was an unregulated, open access fishery and squid often ranked as
19 California's largest commercial fishery and highest edible fishery export (CDFG, 2001).
20 To better control this rapidly expanding fishery the CDFG instituted new regulations,
21 such as the restricted use of lights, documentation of fishing activity in logbooks,
22 weekend closures, light-boat shielding, and wattage restrictions.

23 As seen in Figure H-2, the annual squid catch offshore California has increased
24 exponentially, doubling approximately every nine years since 1961, when the total catch
25 was a mere 5,000 tons. However, this increase has not been steady. Squid are
26 extraordinarily sensitive to water temperature, favoring temperatures in the high 50s to
27 mid-60s Fahrenheit. In El Niño years, when water temperatures increase beyond this
28 range, the squid catch typically plummets. Significant declines in catch volumes have
29 occurred during major El Niño events in 1983, 1992, and 1997 (Figure H-2). Between
30 2000 and 2005, most of the squid harvested near the Project area were landed close to
31 shore, an area that could be impacted by an oil spill associated with the proposed
32 Project as predicted by the spill modeling described in Section 4.2.

Table H-2
Ranking of Commercial Fish Landings at Local Harbors by Weight and Volume

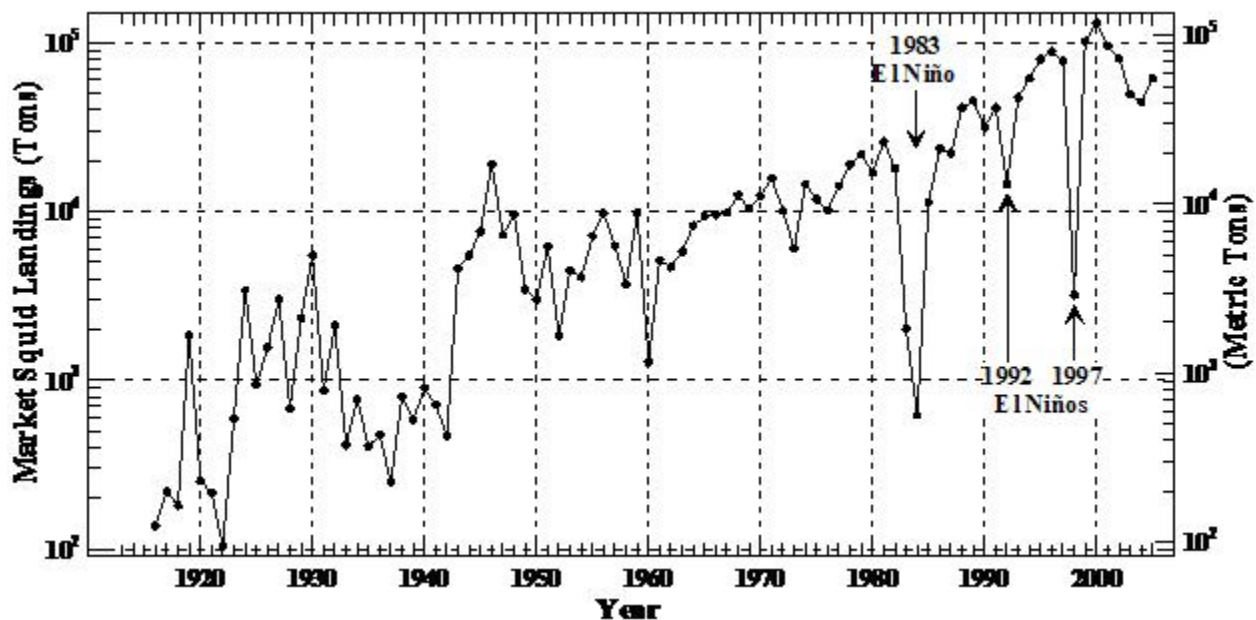
Santa Barbara		Port Hueneme/Oxnard		Ventura		Morro Bay/Avila	
Weight ¹	Value ²	Weight	Value	Weight	Value	Weight	Value
Urchin (14106.2)	Urchin (21.72)	Squid (102178.6)	Squid (30.06)	Squid (33876.1)	Squid (10.14)	Rockfish (76.6)	Shrimp (0.34)
Squid (5393.1)	Lobster (8.09)	Sardine (27494.3)	Shrimp (2.47)	Shrimp (421.6)	Halibut (2.61)	Squid (68.4)	Rockfish (0.25)
Shrimp (1994.7)	Shrimp (5.72)	Anchovy (18134.7)	Sardine (2.45)	Halibut (403.6)	Shrimp (1.72)	Tuna (43.3)	Tuna (0.06)
Crab (1841.3)	Crab (4.42)	Mackerel (3094.3)	Anchovy (2.43)	Crab (312.6)	Crab (0.75)	Shrimp (36.4)	Crab (0.05)
Cucumber (824.6)	Halibut (2.15)	Urchin (937.7)	Halibut (1.76)	Seabass (176.0)	Seabass (0.73)	Sole (32.2)	Abalone (0.04)
Lobster (548.8)	Abalone (1.92)	Tuna (302.8)	Urchin (1.50)	Shark (164.1)	Lobster (0.40)	Crab (20.5)	Sole (0.03)
Halibut (328.7)	Rockfish (1.36)	Shrimp (259.1)	Lobster (1.48)	Sardine (137.7)	Shark (0.34)	Shark (8.9)	Swordfish (0.02)
Shark (243.5)	Squid (1.28)	Halibut (255.5)	Crab (0.64)	Cucumber (106.7)	Cucumber (0.19)	Sablefish (6.4)	Salmon (0.02)
Seabass (200.0)	Cucumber (1.13)	Crab (247.8)	Rockfish (0.50)	Grouper (87.3)	Urchin (0.12)	Salmon (6.3)	Shark (0.02)
Rockfish (157.3)	Seabass (0.73)	Cucumber (228.2)	Cucumber (0.41)	Urchin (78.3)	Rockfish (0.11)	Urchin (5.8)	Sablefish (0.01)
Abalone (103.7)	Shark (0.57)	Rockfish (145.9)	Sheephead (0.30)	Anchovy (71.5)	Grouper (0.10)	Anchovy (5.7)	Squid (0.01)
Snail (67.8)	Sheephead (0.29)	Lobster (105.0)	Mackerel (0.24)	Tuna (69.0)	Sheephead (0.04)	Swordfish (4.4)	Urchin (0.01)
Sheephead (54.9)	Salmon (0.16)	Hagfish (60.9)	Seabass (0.17)	Rockfish (40.2)	Skate (0.04)	Fish (3.7)	Lobster (0.01)
Salmon (38.1)	Snail (0.07)	Shark (60.9)	Shark (0.12)	Skate (39.1)	Sole (0.04)	Abalone (2.2)	Seabass (0.01)
Sole (18.0)	Fish (0.06)	Sheephead (48.1)	Hagfish (0.12)	Lobster (26.9)	Tuna (0.04)	Cucumber (2.1)	Halibut (0.01)
Other (81.6)	Other (0.20)	Other (93.7)	Other (0.16)	Other (105.4)	Other (0.17)	Other (7.4)	Other (0.00)
Total (26,009.8)	Total (49.87)	Total (153,659.1)	Total (44.93)	Total (36,126.7)	Total (17.60)	Total (331.0)	Total (0.92)

¹ Weight is reported in tons.

² Value is reported in millions of dollars.

Source: CDFG 2006a

Figure H-2
Annual Statewide Commercial Squid Landings



Source: CDFG 2004a.

Similar to the variability in squid landings, the catch statistics for abalone have varied substantially over time. Currently, all five major species of abalone (white, black, red, pink, and green) found off central and southern California are considered depleted. This depletion is the result of cumulative impacts from commercial harvest, increased market demand and sport fishery expansion, sea otter depredation, habitat degradation, disease, loss of kelp populations associated with El Niño events, substantial poaching losses, and inadequate wild stock management (CDFG 2001). In response to these pressures, the California Fish and Game Commission closed the commercial and recreational abalone fishery in southern and central California under emergency action in May 1997. By legislative action in January 1998, the closure was extended indefinitely. Therefore, abalone landings were only recorded in the 27-block survey area through 1996 and part of 1997.

Differences in the volume and dollar value of the catch landed at each of the five port complexes are apparent in Table H-3. Although Santa Barbara consistently ranks first in value of commercial catch from the 27-block study region, the loss of revenue from the abalone fishery following 1997 is readily apparent. Landings at Ventura and Hueneme/Oxnard harbors correlated closely with one another, with both exhibiting significant drops in 1998, in response to the strong 1997 El Niño event. Additionally, the

major increase in landings at the Los Angeles/Long Beach port complex in 1999 was due to increased squid landings.

Table H-3
Volume and Value of Fish Commercially Harvested in the 27-Block Region by Year and Port

	Morro Bay/Avila		Santa Barbara		Ventura		Port Hueneme/ Oxnard		Los Angeles/ Long Beach	
Year	Weight ¹	Value ²	Weight	Value	Weight	Value	Weight	Value	Weight	Value
1996	39	0.15	3,690	6.29	808	0.26	4,488	1.49	495	0.15
1997	34	0.13	3,375	6.61	3,266	1.16	9,818	3.20	1,154	0.36
1998	63	0.11	1,910	4.69	363	0.71	3,366	1.57	1,170	0.37
1999	18	0.10	2,582	6.00	4,395	2.02	29,143	8.11	7,936	2.08
2000	19	0.12	2,752	4.61	8,265	2.33	27,822	5.69	2,799	0.70
2001	117	0.17	1,833	3.55	3,856	1.60	24,477	4.27	4,787	1.21
2002	16	0.07	1,908	4.20	4,210	1.91	11,017	2.79	1,474	0.41
2003	15	0.03	2,393	4.44	3,298	2.51	12,081	5.72	1,069	0.61
2004	8	0.03	2,769	4.59	3,456	2.40	17,937	6.41	3,097	1.33
2005	3	0.01	2,798	4.89	4,210	2.70	13,510	5.67	591	0.36
Total	331	0.92	26,010	49.87	36,127	17.60	153,659	44.93	24,572	7.59

¹ Weight is reported in tons.

² Value is reported in millions of dollars.

Source: CDFG 2006a

As described above, the commercial fishery productivity fluctuates during El Niño events, and landings differ among ports for individual taxonomic groups. In addition, the catch is not uniformly distributed across the 27-block study region. Instead, it is heavily weighted toward the Channel-Island blocks (687 through 690 in Figure H-3). Over 21 percent of the total weight and 35 percent of the total value of the commercial catch was from those four fish blocks.

In contrast, fish block 654, which encompasses the Project area and Platform Holly, accounts for less than one-half percent of the commercial landings in the 27-block study region (Table H-4). Overall, non-fish taxa such as urchin, shrimp, lobster, and crab were the primary catch landed within the block for both total biomass and total value. Over 61 percent of the total biomass recovered from block 654 was urchin and shrimp. However, the lobster catch ranked highest in overall value in Block 654, accounting for over 32 percent of the total value.

Table H-4
Ranking of Top Fifteen Commercial Fish Taxa
Harvested in Block 654 from 1996 to 2005

Ranking	Taxon	Weight ¹		Taxon	Value ²
1	Urchin	289.6		Lobster	0.90
2	Shrimp	252.1		Shrimp	0.75
3	Sea Cucumber	152.5		Urchin	0.50
4	Lobster	61.6		Sea Cucumber	0.21
5	Crab	39.8		Halibut	0.12
6	Tuna	36.0		Crab	0.10
7	Halibut	14.3		Rockfish	0.08
8	Squid	13.3		Tuna	0.05
9	Rockfish	8.9		Salmon	0.03
10	Salmon	6.9		Abalone	0.02
11	Shark	4.0		Seabass	0.01
12	Seabass	2.5		Shark	0.01
13	Abalone	1.4		Squid	0.01
14	Swordfish	1.1		Swordfish	0.01
15	Sheephead	0.8		Sheephead	0.01
	Total	885.0		Total	2.81

¹ Weight is reported in tons.

² Value is reported in millions, of dollars.

Source: CDFG 2006a

1 Within the Project area, between Platform Holly and the shoreline, fishing is largely
2 focused on crab, lobster, and halibut. As discussed in Section 4.6, Cultural Resources,
3 crab and lobster traps constituted nearly half (42 percent) of the 592 seafloor features
4 identified in the high-resolution bathymetric survey conducted as part of this EIR.
5 Although many of these traps were abandoned, their large numbers attest to the
6 intensity of this fishery within the area potentially impacted by the proposed Project.
7 Also during the offshore survey, commercial halibut trawling was observed near the
8 pipeline corridor that extends from Platform Holly to the EOF. In contrast to many areas
9 of the southern California coast, halibut trawling is allowed within the three-mile (4.8 km)
10 limit between Pt. Dume and Pt. Arguello, and is most common in water depths of 60 feet
11 (18m) or more.

12 Gear

13 Several types of fishing gear are utilized by commercial fishermen within the 27-block
14 study area (Table H-5). As a result of fluctuations in market demand, prices, harvest

regulations, and fish availability, commercial fishers within the study area may fish for several species throughout the year. As such, several types of fishing gear are used, including the usage of gear types capable of targeting multiple species (MMS 2005b). Common gear types used in the region include: (1) seines for coastal pelagic species such as sardine, northern anchovy, mackerel, and market squid; (2) trawls for shrimp, sole, flounder, and halibut; (3) hook and line/longlines for rockfish and other rocky outcrop fish; (4) traps for crab and lobster; (5) drift/set gillnets for shark and swordfish; and, (6) trolls for albacore and salmon.

Table H-5
Comparison of Commercial Fish Landings between the entire 27-Block Study Area and Block 654 from 1996 to 2005 as a Function of Gear Type

Weight			Value		
Gear	Region	Block 654	Gear	Region	Block 654
Seine	211,504	13	Seine	52.15	0.01
Diving	15,636	295	Diving	25.97	0.53
Trawl	4,166	415	Trap	18.21	1.01
Trap	3,488	106	Trawl	13.35	1.03
Net	3,237	1	Gill Net	6.44	0.02
Gill Net	1,658	7	Hook & Line	3.40	0.15
Hook & Line	902	20	Net	1.23	0.00
Troll	156	40	Troll	0.29	0.07
Other	6	0	Other	0.02	0.00
Harpoon	1	0	Harpoon	0.00	0.00
Grand Total	240,755	896	Grand Total	121.07	2.82

¹ Weight is reported in tons.

² Value is reported in millions of dollars.

Source: CDFG 2006a.

Within the entire 27-block study area, purse seiners targeting squid were responsible for landing the largest biomass (Table H-5) (Vojkovich, 1998). Seines are generally used to encircle schools of pelagic fish species. Seiners will traverse an area along an erratic course searching for schools of fish using sonar. Once a school is found, a net is laid out on the surface to encircle the prey species. Floats along the upper lead line keep the top end of the net at the water surface. Metal rings are sewn along the bottom edge, and a cable is passed through the rings. When the cable is drawn tight, the net “purses” (Fields, 1965). While the season for pelagic fishes is open year-round, the CDFG sets catch quotas. When these quotas are filled, the fishery is over for that year unless an extended quota is subsequently issued.

1 Although seiners represented the largest biomass catch throughout the 27-block study
2 region, within block 654, trawling and traps accounted for the largest catches. This is
3 consistent with anecdotal observations of fishing activities observed during the offshore
4 survey conducted as part of this EIR. Traps are predominantly used to catch non-finish
5 species such as urchin, shrimp, lobster, crab, and abalone. These species have
6 historically been the most profitable catches within block 654 over the past decade.

7 Trawlers are responsible for extracting the greatest value from Block 654 (Table H-5),
8 principally from the harvest of high value species such as shrimp, sea cucumber, and
9 halibut. Trawls can be conducted either in midwater or along the seafloor, although
10 bottom trawls occur most often in the study region. In their most basic form, trawls are
11 funnel-shaped nets that are towed over the seafloor. As they are towed, the rope,
12 chain, or line (e.g., tickler chain, bridles, etc.) that precedes the net opening scares prey
13 up off the ocean bottom, to be captured in the netting that follows. The opening of the
14 trawl is maintained by a headrope with floats on the top, a footrope with weights on the
15 bottom, and doors to each side that spread the net horizontally on the seafloor.
16 Trawling varies seasonally within the 27-block study region.

17 Trapping is another important fishing method used within the study area. Pots and
18 traps come in a variety of shapes and sizes. In the Project area, they are used primarily
19 to capture crabs, lobsters, and to a lesser extent, prawns and certain fish species.
20 Typically, several pots or traps are attached to a heavy groundline with an anchor or
21 heavy weights attached at both ends. The ends of the line are connected to a surface
22 buoy containing a marker. Crab pots in particular are set in hard-bottom habitats. They
23 can be set individually or in groups attached to a common groundline. During
24 installation and retrieval of traps and pots, they can be dragged several meters along
25 the bottom. Pots and traps are generally used at water depths less than 650 feet (200
26 m) near hard bottom habitat or along the edges of canyons. However, pot fishing for
27 sablefish can occur at depths up to 1,650 feet (500 m) along the edge of the continental
28 shelf.

29 Several fishing methods that use hooks attached to lines are utilized in the area for
30 specific fisheries. Although they account for smaller biomass and value extracted from
31 Block 654 than either seining or trawling, they are important throughout the larger
32 27 block study region. Vertical longlines employ a series of hooks attached to a
33 weighted line and are suspended vertically in the water column. Vertical longlining is
34 commonly used to fish for rockfish over hard-bottom structures. Horizontal bottom
35 longlines are similar to vertical longlines except that the hooks lay on the seafloor.

1 Weighted ends keep the line on the seafloor. Horizontal longlines are used to catch
2 bottom fish such as halibut.

3 Trolling consists of towing a baited hook or lure behind a boat. Trolling commonly
4 occurs in the water column high off the bottom, but in certain years, trolling for salmon
5 can occur close to the seafloor. Pelagic fish such as salmon or albacore tuna are the
6 primary target catch within the study region.

7 Gill and other nets are also used within the 27-block study area. Gill nets consist of a
8 vertical wall of netting. Weights and anchors on the bottom horizontal line anchor the
9 bottom portion of the net to the seafloor while a series of floats on the top lead line lift
10 the upper portion of the net towards the ocean surface. Gill nets are used for a wide
11 variety of fish including halibut, yellowtail, and rockfish.

12 Diving has been one of the most important commercial fisheries within the 27-block
13 study area, particularly in terms of the value of the catch. Most of the commercial diving
14 in the region occurs along the Channel Islands. Divers primarily harvest sea urchins,
15 although until 1997 abalone were also harvested within the study region. A small
16 fishery also exists for sea cucumbers. Diving accounted for 33 percent of the biomass
17 harvested within Block 654 and was used for the entire urchin harvest within the block.

18 **Recreational Fishing**

19 Recreational fishing activities in the Santa Barbara Channel area occur from a variety of
20 platforms. These include private or charter vessels, piers, and the shoreline (e.g.,
21 beaches, jetties, breakwaters). Other than fishing logs maintained by the commercial
22 passenger fishing vessel (CPFV) fleet, reliable recreation fish landing data for specific
23 locations off the coast are not available. Data on fish landed by the CPFV fleet that fish
24 in the Project area are provided in Table H-6. The numbers provided in the table are
25 conservative estimates of CPFV catch landings because not all CPFV operators
26 participate in the logbook program (Thompson, 1999).

27 Nearly half (49.6 percent) of the CPFV catch in the Santa Barbara Channel occurred
28 near the Channel Islands, even though the seven Island blocks (684 through 690,
29 Figure H-3) account for only 12.8 percent of the total Channel area (Table H-6). The
30 CPFV catch fraction around the Islands significantly exceeded the fractional area for all
31 but two major taxa (barred sand bass and mackerel). Additionally, essentially all of the
32 lobster harvested within the Channel was caught at the Islands. In contrast, the CPFV

- 1 catch in the fish block encompassing the Project area (654) was underrepresented
 2 relative to the total area covered (approximately three percent).

Table H-6
Ranking of Recreationally Harvested Fish in the Santa Barbara Channel
from 1996 to 2005

Taxon	SB Channel Total¹	Island Fraction²	Mainland/ Open Fraction
Rockfish	1,217,191	59.1%	40.9%
Barred Sand Bass	425,832	7.0%	93.0%
Kelp Bass	371,134	38.1%	61.9%
Whitefish, ocean	227,119	82.9%	17.1%
Barracuda	180,647	39.3%	60.7%
Scorpionfish	124,288	74.2%	25.8%
Scallop	94,356	45.7%	54.3%
Mackerel	54,946	10.4%	89.6%
Sheephead	41,796	85.9%	14.1%
Halfmoon	39,514	87.2%	12.8%
Lobster	31,473	97.8%	2.2%
Yellowtail	25,860	82.1%	17.9%
Other Fish Species	146,621	56.2%	43.8%
Total	2,980,777	49.6%	50.4%

¹ Total fish count based on CPFV logs.

² Fraction of fish caught in the seven blocks (684 through 690) that encompass the Channel Islands.

Source: CDFG 2006a.

- 3 Table H-6 shows that rockfish (Scorpaenidae) dominate (41 percent) the CPFV catch
 4 within the Santa Barbara Channel. Thompson (1999) estimated that private boats and
 5 the CPFV fleet land an equal number of rockfish. Combined, they account for 20
 6 percent of the rockfish caught offshore California since 1982. There are over 60
 7 different species of rockfish found offshore California, 56 of which are known to reside
 8 within the Southern California Bight. All 15 rockfish species that have been formally
 9 assessed to date have populations that are currently below optimal abundance levels.
 10 Six rockfish species, including four that are important to California anglers (bocaccio,
 11 canary rockfish, widow rockfish, and cowcod), are at such low levels (estimated at or
 12 below 25 percent of the pristine population of each species) that they have been
 13 declared overfished by the Pacific Fisheries Management Council. For the recreational
 14 fishery, bag limits have been reduced, gear restrictions imposed, seasons closed, and
 15 minimum size limits established (CDFG 2001).

However, rockfish are spatially localized, preferring high-relief hard-substrate seafloor features that are regularly visited by the CPFV fleet that targets them. Optimal areas are located along the northern shorelines of Santa Rosa and San Miguel Islands within fish blocks 688, 689, and 690 (Figure H-1). Together, these blocks account for 23 percent of the rockfish reported in Table H-6. In contrast, no suitable hard-substrate features are frequented by the CPFV fleet within the fish-block (654) that encompasses the Project area; only one percent of rockfish landings were recorded within that block over the last decade.

The CPFV fishery came under stringent regulations in mid-2002, when fishing was prohibited for rockfish, lingcod, ocean whitefish, and California scorpionfish (sculpin) in waters 20 fathoms and greater in depth (Dotson and Charter 2003). The restricted species were a mainstay for the winter CPFV fishery throughout the region. As a result, harvest counts for these species decreased substantially in 2003, as seen in Table H-7, which documents recreational landings of three key fish species by year. However, in mid-2003, depth restrictions were relaxed, and catch numbers again increased.

Table H-7
Recreational Landings of Rockfish, Whitefish, and Barred Sand Bass by
Year in the Santa Barbara Channel

Year	Rockfish	Whitefish	Barred Sand Bass
1996	151,914	31,292	36,108
1997	137,200	26,287	64,389
1998	118,577	16,890	33,197
1999	137,283	29,484	16,946
2000	96,277	37,422	57,667
2001	98,268	30,871	66,444
2002	98,649	20,342	40,872
2003	66,022	10,716	28,429
2004	156,614	14,270	55,432
2005	156,387	9,545	26,348
Total	1,217,191	227,119	425,832

Source: CDFG 2006a.

The numbers provided in the table are particularly conservative counts, as aside from scallops and lobsters, few landings of non-fish species were reported to the CDFG by recreational charter boats or fishers. The top two taxa reported were the rock scallop and spiny lobster. These species were largely harvested by recreational divers at the

western end of the Channel Islands, and below Point Conception at shallow subtidal water depths such as Naples reef, which lies west of the Project area. As discussed in the previous section on commercial fisheries, landings of abalone were largely restricted to the earliest portion of the decade-long analysis period.

Commercial Kelp Harvesting and Mariculture

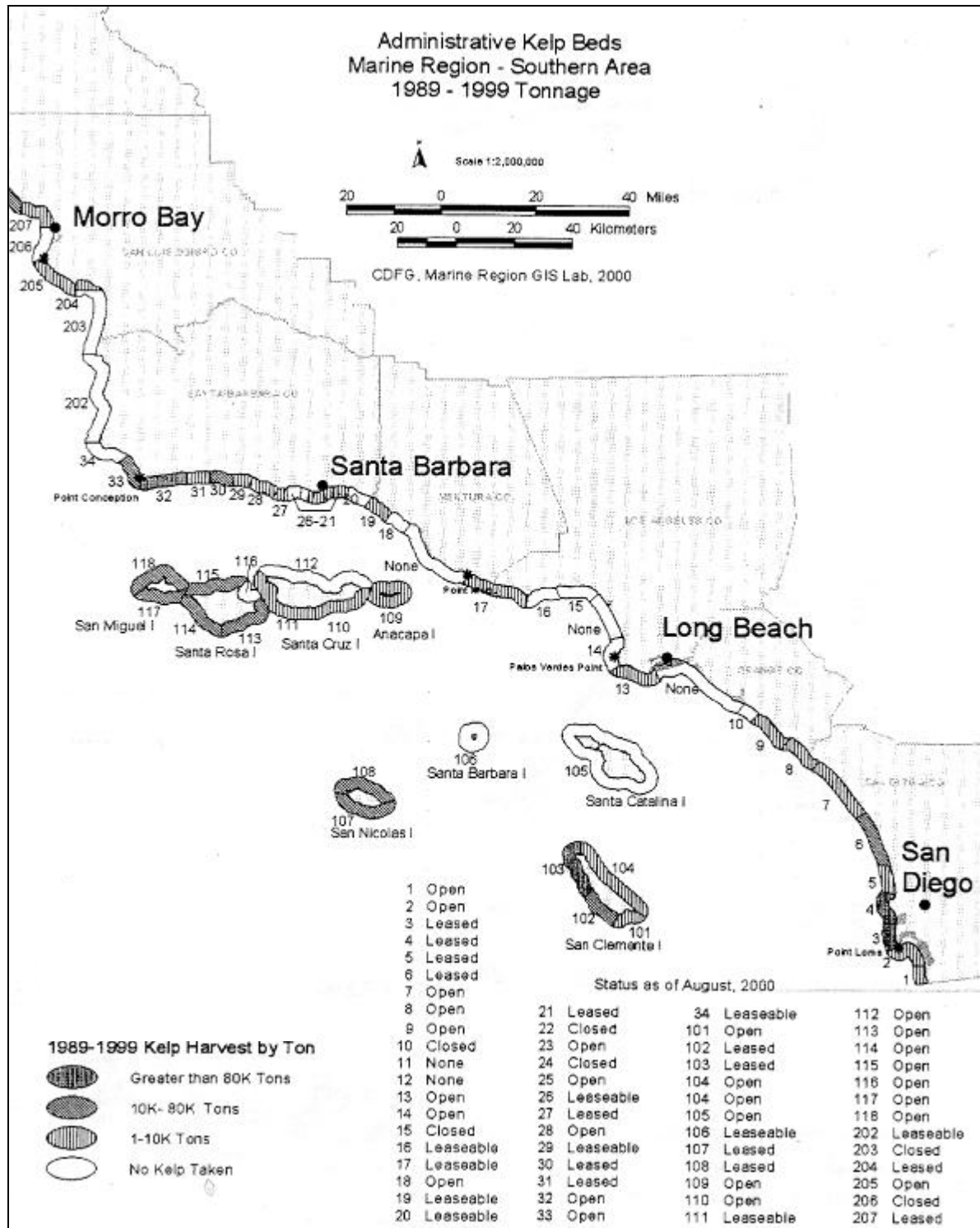
Kelp has been harvested commercially along the coast of California since the early 1900s (Scofield, 1959, McPeak and Glantz, 1984; Neushul, 1987; Tarpley and Glantz, 1992). Beginning in 1911, many small companies began harvesting along the coast between Santa Barbara and San Diego.

In the early years, most kelp was harvested for the extraction of potash and acetone. These chemicals were used to manufacture explosives during World War I. Later, in the 1920s, P.R. Park, Inc. of San Diego began harvesting kelp for use as an additive to livestock and poultry food. Mariculture companies rely on giant kelp as a food source for their stock, particularly for grazing species such as abalone.

Over time, other uses for kelp and kelp derivatives have come into being. For example, algin is a kelp derivative that is commonly used as a thickening, stabilizing, suspending, and gelling agent in a wide range of foods, such as desserts, gels, dairy products, and salad dressings. Industrially, it is used in paper coatings, textile printing and welding-rod coatings. Algin is also used as a thickening and binding agent in pharmaceutical, cosmetic, and dental products. Annual sales of algin products manufactured in California exceeded \$40 million (CDFG, 2000).

The CDFG is responsible for the management of kelp beds off the coast of California. In 1931, they charted and numbered the kelp beds in coastal waters for management purposes. The numbering system has changed over the years, but there are presently 74 designated beds stretching from the U.S.-Mexico border to Point Montara in San Mateo county (CDFG, 2000). Kelp beds in the southern California region from the U.S.-Mexico border to Point Arguello are numbered one to 34 along the mainland and 101 to 118 around the Channel Islands (see Figure H-3). Figure H-3 shows that a number of actively harvested kelp beds lie along the mainland coast adjacent to the Project area. These kelp beds can produce as much as 1,000 tons (907 metric tons) of kelp per year. Each kelp bed is of varying size and is delineated by true bearings. The amount of kelp that appears within each bed changes with time.

Figure H-3
Locations and Yields of Kelp Beds in Southern California



Source: CDFG 2000

1 Statewide, more than 20 harvesters hold current licenses to collect kelp. Among the
2 largest of the commercial kelp harvesters is Kelco, currently known as ISP Alginates.
3 ISP Alginates has harvested and processed giant kelp off California since 1929. Over
4 the years, they have developed many applications for algin, which is found in the cells
5 of the kelp. Initially, ISP Alginates only harvested kelp beds near San Diego. However,
6 in response to production needs and changes in kelp productivity, ISP Alginates later
7 expanded their harvest area. In recent years, they have leased 15 kelp beds, covering
8 a total of approximately 28 square miles, from Monterey Bay to Imperial Beach near the
9 U.S.-Mexico border, and have accounted for up to 95 percent of the kelp harvested in
10 the entire State (CDFG, 2000). As a result of ISP Alginate's relocation of its
11 manufacturing facilities to Scotland in early 2006, the statewide kelp harvest is expected
12 to undergo a dramatic decrease.

13 As discussed above, the mariculture industry also uses commercially harvested giant
14 kelp. Generally, kelp is used as a food source for their stock, particularly abalone.
15 Abalone aquaculture businesses range in size from large companies to small hobby
16 operations. In 1999, the combined abalone aquaculture firms accounted for less than
17 1.7 percent of the annual kelp harvest (CDFG, 2000). However, their harvest is
18 expected to increase in future years, as the supply of wild abalone continues to
19 decrease worldwide. The Cultured Abalone of Santa Barbara currently leases bed 27,
20 just west of Santa Barbara. Since 1966, its kelp harvest has increased by 15 percent
21 annually in response to a growing abalone market (CDFG, 2000). In 1999, the Cultured
22 Abalone harvested 560 tons (508 metric tons) of kelp. At that time, they expected to
23 continue to increase their kelp requirement by 15 percent annually through 2004 (CDFG
24 2000). Currently, approximately half of their tonnage comes from kelp lease 27, while
25 the remainder is taken from kelp beds near Cambria.

26 Commercial kelp landings have been monitored since 1915 (Tarpley and Glantz, 1992).
27 Two types of data are collected as part of the monitoring effort. The first type of data
28 consists of landing records that provide the weight, species, collector, and location of
29 kelp harvested. Harvesters are required to provide this data to the CDFG on a monthly
30 basis (CDFG, 2000). The second type of data consists of non-landing statistics that are
31 normally collected by the State agencies, the kelp harvesters, and the academic
32 institutions. For example, ISP Alginates, the primary kelp harvester in California
33 through 2006 has conducted resource aerial surveys on a regular basis since 1958.
34 Most of the data they collected, however, is proprietary and unavailable to the public.
35 The CDFG also conducts aerial surveys. Since 2002, they have been flying annual

aerial photo surveys of all of California's kelp beds. Previous surveys occurred only intermittently.

The harvest or landing data submitted to the CDFG provides information on the category of plant landed, amount landed, location of harvest, and the name and address of the person or firm to whom the harvest was sold. The statewide kelp harvest data are summarized in Table H-8. The annual California kelp harvest since 1916 has also been published by the National Marine Fisheries Service (NMFS, 2006) and shows a trend of declining harvests since the 1960's and 1970's when more than 120,000 tons were consistently harvested on an annual basis. As described earlier, the tonnage numbers for the 2006 harvest, when available, are expected to exhibit a dramatic decline from those in Table H-8, because ISP Alginate moved its manufacturing facilities from San Diego California to Scotland at the beginning of the year. Additionally, the unusually low total landings reported in Table H-8 during 2002, are inconsistent with the NMFS data and suggest that the CDFG totals are 25,284 tons too low, probably because of underreported harvesting in the leased beds. Except for 2001, 2002, and 2003, the total harvest from the leased beds was significantly higher than in open beds, even though there were half as many active leased beds as open beds.

Table H-8
California Kelp Harvest (*Macrocystis pyrifera*) for 1995-2005

Year	Open Beds	Leased Beds	Total Tons
1995	4,217	73,536	77,753
1996	13,537	64,924	78,461
1997	12,366	32,977	45,343
1998	2,090	23,223	25,313
1999	8,076	34,135	42,211
2000	14,506	27,438	41,944
2001	23,035	17,262	40,297
2002	18,953	7,631	26,584
2003	25,111	25,633	50,744
2004	8,185	33,986	42,171
2005	26,463	46,142	72,605

Source: CDFG 2006

1 Kelp Harvesting Vessels

2 Kelp is harvested by reciprocating blades that are lowered into the water to a depth of
3 three feet (one m) as the ship moves stern-first through the kelp bed. As the kelp is cut,
4 it is brought aboard via a conveyor system. Harvest vessels can carry as much as 600
5 tons of kelp, which can all be collected in a single day (CDFG, 2000). The large harvest
6 vessels have a draft of approximately 12 feet (four m) and work at water depths greater
7 than 30 feet (10 m).

8 Kelp harvest vessels used by abalone aquaculturists are smaller than those used by the
9 commercial harvesters. The smaller vessels have a shallower draft, making them
10 capable of working in shallower waters. They typically carry between 15 and 25 tons of
11 kelp. Kelp is also harvested by hand from smaller boats to supply abalone farms. It is
12 either cut at the surface using a knife attached to a pole, or cut beneath the water
13 surface by a diver and is generally pulled aboard the boat by hand.